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ANTHRAX, WITH SPECIAL REFERENCE TO THE RECENT OUTBREAK IN PIGS*

BY

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I am honoured that a predominantly Scottish Division should have asked me, from London, to give an address. I am well aware that many people in Scotland are not necessarily impressed by everything which emanates from that quarter, but it does not take much courage on my part to take the chance ; for two reasons. The first and obvious one is that your meeting is taking place south of the border. The second is that I was reared on a farm in Co. Antrim which, I am given to understand, once formed part of the ancient kingdom of Dalriada comprising a large tract of country on both sides of the North Channel. For another reason I feel a little diffident—anthrax is no new occurrence in this area and I am sure you all already know what there is to be known about it so that I can hardly hope to be very informative.

Historically, anthrax is a famous disease. In 1876 Koch proved that *B. anthracis* was the cause of the disease and Pasteur's later experiments in attenuation of the organism and protective inoculation laid the foundation of the science of immunology. Notwithstanding its relative antiquity, the recent increased prevalence in this country has awakened the interest of the lay public and members of Parliament. It has also perturbed many farmers and members of the veterinary profession. It is altogether fitting, therefore, that we should have this discussion even if it turns out that it serves no other purpose than to brush up the knowledge we acquired in earlier years. It is also perhaps wise periodically to examine again the prevalence, incidence, and behaviour of the disease, for it could be that, like some other diseases, it is undergoing a change of character. It is hoped to show that the only new feature which has presented itself in the last year is the marked increase of confirmed cases amongst pigs in this country. It seems likely that anything we may consider to be changed will be attributable to changes in the chances of infection rather than to any intrinsic change in the disease itself.

THE 1952 OUTBREAK

During the year 1952 there were 1,215 outbreaks of anthrax officially confirmed in Great Britain. This is the highest number recorded since the present method of diagnosis was established in 1910. It will be remembered that legislative action was taken in that year which required confirmation of reported cases of anthrax by the Board of Agriculture (now the Ministry of Agriculture).

The different classes of animals involved were :—

Cattle ...	729
Sheep ...	1
Pigs ...	479
Horses ...	1
Dogs ...	4
Deer ...	1

Possible origin of outbreaks :—

Artificial feeding-stuffs	1,001
Fertilisers (includes shoddy)	42
Combination of the previous two	38
Tannery effluent	20
Previous outbreak on same premises ...	21
Carcase meat	1
No determinable explanation	92

(Where there was more than one possible origin the most likely one is selected.)

It must be emphasised that, in the majority of cases, the above are no more than conclusions reached from a consideration of the reports of the field officers.

Average mortality per outbreak : cattle, 1·07 ; pigs, 1·2.

Percentage of total cattle and total pig populations which died of anthrax :—

Cattle ...	0·008, or 1 in 12,000
Pigs ...	0·012, or 1 in 8,300

Since 1910 the highest number of outbreaks previously recorded in any one year was in 1938, when there were 830 (of which 45 were in pigs).

The lowest number recorded was in 1946, when there were 95.

Allowing for a time lag in distribution of feeding-stuffs, the records also show that there was a marked decrease in anthrax outbreaks during both the 1914-1918 war and the last world war.

It is very likely that this is due to a decrease in the overall amount of imported animal feeding-stuffs or to an alteration in the type of material imported, or the countries of origin, or to a combination of all three.

Fairly large quantities of bones are imported into this country for various purposes, mostly for glue and gelatine making, for bone charcoal making (used in sugar refining) and as fertiliser. Enquiry from the trade failed to establish that unprocessed bone meal is used as animal food supplement. Residues of processed bones, of course, are so used. Bones come from many countries and some are described as sun-dried. There is little doubt that some of these are the remains of animals which have died. Persons handling these bones at factories have contracted anthrax—there have been 10 at one factory alone in the last two years. Again, it is known that in the last year two persons who handled the bags in which the bones are imported at a sack merchant's premises also became affected. Therefore, imported bones undoubtedly contain anthrax spores. Bone meal used as fertiliser is not subjected to any sterilising process and is therefore likely to be a potent source of danger. It is difficult to see how the bone residues of the glue and gelatine industries can be dangerous in view of the processes to which they are subjected. It may be, of course, that they could be recontaminated by machinery which has been used in grinding and mixing fertiliser and by being put into second-hand sacks which have previously been used to import infected raw material. One possibility, as I will mention again later, is that the methods used in processing the bones may not be as completely efficient in the matter of killing anthrax

* Address to the Dumfries and Galloway Division, B.V.A., at Carlisle, February 26th, 1953.

spores as is generally thought. "Bone and meat" meal from both home and foreign sources is a common supplement of animal foods, but because of the processing to which it has been subjected it can only be dangerous if contaminated after processing. There has been speculation as to whether raw bone meal finds its way into animal feedstuffs ; if only because of the price factor it would be unwise to consider this a common occurrence. However, it is interesting to note that, more than once, as a result of a case of anthrax, enquiry has shown that fertiliser containing raw bone meal was added to the feed by the owner.

Imported feeding-stuffs of vegetable origin cannot be exonerated and have been shown to be contaminated. The growing crop may be contaminated by animals dead of anthrax in countries which have poorly developed veterinary sanitary services and in which climatic conditions are favourable. Another source of contamination is contact with infected material in transit, *e.g.*, holds of ships which have carried bones, contact with wool, hides, etc., in ships and warehouses. In the case of the so-called "cakes" which generally originate in tropical or semi-tropical anthrax-endemic countries, the oil extraction process may not always be sufficient to kill anthrax spores.

There is ample evidence over a very long period upon which to base the view that the vast majority of outbreaks of anthrax in this country are due to the use of imported feeding-stuffs. The annual reports of the C.V.O. in successive years, and notably the report of 1929, are informative on this point.

Fertiliser containing unprocessed material of animal origin is an obvious danger. One should not accept without question that its relative importance is in exact accordance with the figure for origins of outbreaks given earlier. It may have been used on root crops or on fodder crops in an earlier year ; it could contaminate crops used for animal food and it might not be easy to relate this to a particular case. Again, it has been reported that animals in adjoining pastures have become affected after a high wind had blown some of the fertiliser over the land. Recently it has been reported during an investigation into the bacterial flora of sparrows that 2 per cent. of sparrows had anthrax spores in the crop. (Shrewsbury & Barson, 1952, *J. Path. & Bact.* **64.** 605.) This investigation had no relation to an anthrax enquiry. Where did the sparrows pick up anthrax ? Could they carry the disease mechanically ? Perhaps they are attracted to bone fertiliser used as a surface dressing for crops.

Other sources of infection are the effluents from tanneries, wool mills and allied trades. These are, of course, confined to well-defined areas.

In sheep and cattle, as you know, the disease is usually an acute septicaemia and very often fatal. However, I think we all recognise that, in cattle at any rate, some do recover without treatment even after showing very severe symptoms. Organisms cannot be recovered in the living animal until just before death. It would be interesting to hear if anyone has had experience of recovering organisms from the blood of cattle or sheep which survived. Diagnosis in the case of cattle or sheep dead of anthrax is simple in the very large majority of cases if the animal is examined within a day or two of death. Almost invariably typical *B. anthracis* may be demonstrated in smears made from a sample of blood taken from a peripheral vein. It is possible, of course, for some kind of circumscribed lesion caused by *B. anthracis* to cause death in cattle or sheep without the development of septicaemia, but this occurs so rarely that it may be ignored. The situation with pigs is entirely different, but before we go on to that let us just note that although the sheep is an extremely susceptible animal the number of outbreaks in sheep recorded in this country is relatively insignificant. My personal view is that this is in accordance with expectation. It may be that because of the conditions under which many sheep are found dead, a number of cases are not reported, but the disparity in numbers of cases relative to cattle cases is so great that this cannot be the only factor. If the view is correct that imported feeding-stuffs introduce the organisms to cattle, then it is natural to expect fewer cases in sheep. Also a large proportion of the sheep population is not grazed on or near land manured with bone manure and therefore is unlikely to pick up infection in this way.

In this country up till 1952 it has generally been possible to relate cases of anthrax in pigs to the consumption of flesh or offal of an infected carcase or blood from the natural orifices. In many such cases the typical swelling of the neck or throat has been seen and diagnosis has been made from material obtained from the cervical lymph nodes. As you all know, the disease in pigs is only very infrequently a septicaemia. At any rate, acute manifestations are accompanied by and follow disturbances of a local character. An example is the pharyngeal or tonsillar lesion just mentioned in which, if the lesion is severe, death ensues fairly rapidly. Recoveries, however, are not uncommon.

By far the most common method of infection in pigs is via the intestine, in which case there is no external lesion to be seen. The symptom complex is that of digestive disturbance, diarrhoea, constipation, etc. *Post-mortem* lesions are described by American and German writers and Mr. J. E. Saunders, of Bedford, recorded four cases in *The Veterinary Record* of December 30th, 1939. In general, there is localisation in the walls of the intestine causing a severe inflammatory process which may result in haemorrhage and/or ulcer formation ; or, if the animal has sufficient resistance, in the formation of scar tissue followed by recovery. In the latter case the lesion is only discovered in the abattoir during meat inspection. Most of the cases which have occurred in this country in 1952 have been of the intestinal type. When the intestinal lesion has been sufficiently severe to cause death there is usually a peritonitis and organisms for diagnostic purposes can be recovered from a swab taken from the peritoneal fluid. In the intestinal type of disease organisms are not generally recoverable from the cervical region. The disquieting thing about the intestinal cases is that in the case of open lesions in the alimentary tract anthrax bacilli will be eliminated with the faeces. It seems to me, therefore, that the greater the number of anthrax cases in pigs the greater the chances of the excretion of organisms from intestinal cases with the resulting possibility of infecting soil, foodstuffs, water, etc. In view of the fact that in suitable circumstances *B. anthracis* is a facultative organism, the chances of setting up new foci of infection are obvious.

There is also a public health aspect in the case of recovered animals which are subsequently slaughtered for the food of man. This may not be as serious as it would appear at first sight, for it is likely that the organisms gradually will have disappeared from the lesion with the healing process. However, vigilance by the meat inspection service is necessary.

An analysis of the 479 outbreaks in pigs does not show that there has been serious spread from pigs in the series of outbreaks under discussion. In a few instances there have been multiple deaths on the same premises (the highest was six) but the average number of deaths per outbreak is only 1·2. From 1887 up to and including 1911, the average number of cases of anthrax in pigs was about 200. However, with the introduction of the requirement in 1910 that the diagnosis must be confirmed by the Ministry, the number of cases dropped and since then the highest number confirmed in any one year was 59 in 1923. It is thought that the majority of these derived from a cattle case (I have not checked the origins as all the records are not now available).

In 1952 we have had 479 cases in pigs the majority of which were intestinal cases. How has it come about that the picture of the disease in pigs has changed so dramatically?

Here I propose to take my imagination for a small and, I think, not very adventurous flight. There is not sufficient data to prove what is suggested as the explanation of the increase in numbers of cases of anthrax in pigs, but to me it sounds not too far fetched. (1) The increasing practice of feeding to pigs rations containing protein supplement. This protein supplement may be of animal or vegetable origin and is largely imported. It is admitted that this practice has been building up for some years but it may be that it is not every year that there is any weight of infection in the ingredients or one or other of them. We can all remember the time when pigs were fed largely on a straight diet of meal, potatoes, whey, etc. As long ago as 1905, in the annual report of the C.V.O., it was remarked that a case of anthrax occurred in pigs which had been fed imported cake and that as this was such an unusual diet, it was circumstantial incriminating evidence in the absence of any other likely source of infection. In short, the suggestion is that pigs have now more chances of contracting disease. (2) A greater awareness of the disease in pigs has led to more cases being diagnosed. I do not subscribe to the view that a major part of the rise in the numbers can be attributed to this, although it is no doubt a contributory factor. (Our professional colleagues must have suspected some of the extra 400 cases.) (3) It may be that in the spring, when cases in pigs first became numerous, material from cases which were not suspected contaminated pastures, piggeries and other places where the organism could live and multiply and sporulate on dead organic matter when summer conditions were favourable. In these circumstances it is believed in some countries that the disease can be disseminated by flies. I do not know if this could happen in this country, but the pig and piggeries are often attractive to flies. As I mentioned earlier, anthrax spores were found in random specimens of wild sparrows. There is no reason why spores should not be mechanically transferred in this way, especially if contaminated manure or fertiliser is exposed. This amounts to a suggestion that disease may have been spread by indirect means from material contaminated by earlier unrecognised cases.

Whatever view may be taken of the three factors just mentioned as explanations of the increased prevalence of anthrax in pigs, the fact remains that the great majority occurred on premises where anthrax was not previously known to exist and that it must have been introduced in some way.

. . . . .

The question now arises as to what additional steps may be taken to deal with anthrax. I have used the word "additional" because the present Anthrax Order prescribes certain action. It was designed primarily to prevent the spread of anthrax from suspected cases in this country and when completely and efficiently complied with this object is, generally speaking, achieved. We need not spend time discussing the Anthrax Order, with which you are all well acquainted.

The prevention of the importation of materials likely to harbour anthrax organisms is a matter of Government policy and will not be discussed by me. I will, however, venture to remark that in the case of a large number of animal feedstuffs it would not be practicable to require sterilisation, and prohibition would raise the question as to whether it is worse to have a few animals die of splenic apoplexy or a large number die from inanition. Incidentally, the inanition would not be confined to animals.

There remains something which I think the profession can do to minimise the risks of spread of disease from those cases where disease is not suspected. The latter will be mainly pig cases which I will mention later. In cattle, in all cases of unexplained death, especially if sudden or only after a short illness, anthrax should be eliminated by examining a blood smear. This is not a laborious or difficult procedure. In no circumstances should permission be given for the carcase to be removed to a knackery or cut until the microscopic examination has been made and found negative. It has occurred that a smear has been taken and not examined at the time. The carcase has been allowed to go to a knackery and a later examination of the slide has shown anthrax—such action is not understood, dangerous, and possibly illegal. In pigs, if there is any suspicion of anthrax, the same procedure should be followed except that the material to be examined will be a smear from the peritoneal fluid.

In view of the character of the disease in pigs and the common occurrence of intestinal infection, often with no history suggestive of anthrax, a *post-mortem* examination may have been embarked upon. Therefore it is of the greatest importance that all such should be carried out with the utmost care. In order to prevent the spread of disease—and this applies whether the disease is anthrax or not, or whatever the animal—no carcase should be opened or cut unless it is in a place where other animals cannot come into contact with it or body contents which may be exposed. If it is not in a suitable building which can be disinfected and the carcase disposed of without risk, it should be moved to where it is to be buried. The pig may be placed on sacking or some such material which can be buried along with the carcase and viscera. After burial the surroundings should be disinfected and if necessary fenced off to prevent access of animals. There is no need to remind this audience that rubber gloves should be worn and personal disinfection carried out.

If all *post-mortem* work were done with extreme care the difficulty of diagnosis in occasional pig cases would be largely nullified as regards the danger of spread of disease.

As regards disinfection, the difficulty of destroying anthrax spores is illustrated by the following experiment which has recently been carried out at the Ministry's Laboratory. I am indebted to Mr. Hudson for permission to give the following summary.

Small pieces of ox ribs were used, occupying about 1½ inches in the bottom of a 7-inch by 1-inch test tube. To these were added avirulent anthrax organisms. In a second tube anthrax suspension alone was placed. Each tube was treated with 20 c.c. 5 per cent. hydrochloric acid and left on the bench. Five and 10 days after setting up, anthrax organisms could not be recovered from the tube without bones.

Five and 10 days after the start of the experiment anthrax organisms were alive in the tube with bones. On the 10th day the acid was removed with a pipette and 40 c.c. of fresh 5 per cent. HCl were added to the bones. The fluid removed was treated with milk of lime and the precipitate of dicalcium phosphate was filtered through paper. The filtrate was sterile. The precipitate, which had been dried in a desiccator overnight, was divided into three parts. One was plated without further treatment. One was treated for 10 seconds at 100° C. and the third was exposed to 180° C. for 10 seconds. These last two were also plated. Anthrax was recovered from all three.

Fifteen days after the start of the experiment organisms were still present in the bones. After 20 days they were still present. On the 21st day the acid was removed and a further 40 c.c. of freshly prepared 5 per cent. acid were added.

Thirty-three days after the start organisms were still alive.

Next day the acid was removed and 20 c.c. of new acid were added.

Fifty-four days from the start the cultures were still positive.

This has a bearing on some of the methods of processing bones for various purposes and raises a doubt whether certain accepted methods are wholly efficacious for the purpose of destroying anthrax spores. The destruction of organisms contained in or protected by various media is difficult and exact calculation is not possible. In practice it is necessary to play for safety.

Prevention and Treatment

In this country anthrax is not sufficiently prevalent to warrant a wholesale campaign of vaccination, but in certain circumstances it may be advisable, *e.g.*, it has been practised for years in certain limited and well-defined areas where anthrax has become endemic, probably from industrial effluent. Good results have been obtained. Recently, the Ministry has made anthrax vaccine available at a small cost to veterinary surgeons for use in cases where it seems justifiable.

The following extract from the Divisional Veterinary Officer's Report for 1951 on anthrax immunisation in the Nene Valley district supports the view that vaccination is advisable in endemic areas :—

> "The presence of anthrax has not been confirmed in any vaccinated animal. Thirty-one cases were confirmed in unvaccinated cattle compared with 14 during 1950. Confirmed cases occurred on two premises where vaccinations had been carried out in previous years ; on one farm vaccinations ceased in 1947, and on the other farm in 1946. Four of the owners on whose premises anthrax was confirmed during the year have since had all the stock on their premises vaccinated."

Anthrax serum is sometimes used as a prophylactic and for therapeutic purposes. The prophylactic dose in cattle is 20 to 30 c.c. and in pigs 10 to 20 c.c., administered subcutaneously. The therapeutic dose for cattle is 50 to 100 c.c., repeated if necessary until the temperature subsides. Animals exposed to serious risk of infection should have their temperatures taken, as many in the incubative stage may show no visible symptoms.

Penicillin has also been used therapeutically ; either by itself or combined with serum it is said to give good results. The dose of penicillin is 5,000,000 units soluble penicillin twice daily for cattle and 1,000,000 twice daily for pigs.

A Miscellany

Before I close I might mention one or two items which may be of interest.

During 1951 there was a pronounced rise in the number of cases in pigs in U.S.A., chiefly outside the areas where the disease is endemic. Most writers attributed this to the spread of infection by feeding-stuffs, such as supplements containing imported animal protein and rice products from areas in the U.S.A. where anthrax is endemic.

In Ulster there was a sharp rise in the number of outbreaks in the spring and early summer of 1951. There were 53 in that year, most of which occurred from March to June. The average for the previous 14 years was three. It is understood that a quantity of imported feeding-stuffs was suspected and destroyed, since when there have been few cases.

During the last year anthrax and swine fever have both existed on the same premises at the same time in three instances.

In one case anthrax was discovered in viscera sent in for differential diagnosis from a reported swine fever case.

From time to time anthrax has been recovered from a variety of materials at the laboratory but it is a tedious and difficult procedure, and because of the bulk of the material relative to the amount of contamination in made-up feeding-stuffs, a negative finding is of no value and even a positive finding does not identify the ingredient responsible.

Apparently anthrax is not a notifiable disease under the Public Health Acts, but there is an Anthrax Prevention Act which enables the Minister of Health to make regulations regarding the importation of materials which might be a danger from the point of view of its occurrence in human beings. However, it is a notifiable disease under the Factories Act. This means that notifications are not made of cases which do not occur in places covered by the definition of factory, *e.g.*, farms, etc. It would be interesting to know how many veterinary surgeons, farmers, farm workers, etc., become affected. It is also a disease for the purposes of the Workmen's Compensation clauses of the National Insurance Act.

My friend Dr. Merewether, Chief Medical Adviser to the Minister of Labour, has, at almost a moment's notice, given me a rough summary of the distribution by occupations of the cases of anthrax notified to his Department in the last 20 years. I do not think such figures [appended to paper. —*Editor*] have previously been published, and I am most grateful to Dr. Merewether for giving them. It will be seen that they do not contradict a contention that various imported materials are potential carriers of anthrax.

May I close with the reminder that what I have said does not necessarily represent the official view of my employers.

Human Anthrax—Cases Notified from 1933 to 1952 Inclusive

During the 20 years 1933–52 479 human cases of anthrax with 46 deaths were notified under the Factories Acts.

The figure in brackets throughout represents the number which terminated fatally.

Industry	*Number of cases*
Wool	159 (11)
Horsehair	26 (3)
Hides and skins ..	236 (20)
Other industries ..	58 (12)
	479 (46)

Dock workers accounted for 62 (3) of the 479 cases ; of these 62 cases 52 (3) were handling hides and skins, 6 were handling wool and 4 materials for other industries.

The table below analyses the 58 cases mentioned previously under "other industries."

Industry	Cases	Suspected source of infection
Glue, gelatine, chemical ..	20 (1)	16 (1) Indian bones ; 4 other bones.
Fertiliser ..	14 (6)	8 (1) Indian bones ; 6 (5) other animal products.
Abattoir ..	6 (2)	Animals from United Kingdom.
Rags, sacks, bags	4 (1)	2 (1) sorting ; 1 chopper and bale breaker ; 1 jute examiner.
Docks	4	1 Indian bones ; 1 hides, skins, wool, leather ; 1 seeds from East Africa ; 1 unknown.
Cotton	3	1 winding ; 1 knitting ; 1 cotton goods damper and stretcher.
Seeds	3 (1)	1 barley cleaning ; 1 (1) warehouseman ; 1 sunflower and hemp.
Lorry driver ..	1	Hoofs and horn, meal from South America, India, Africa.
Core maker ..	1	Sea sand, glue (source uncertain).
Tea room foreman	1	Tea (source uncertain).
Coal labourer ..	1 (1)	Sugar beet factory.
	58 (12)	

ELECTRIC STUNNING AND ELECTROCUTION OF SMALL ANIMALS

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[The problem of euthanasia is of great importance to this profession and we welcome this further contribution of Dr. Phyllis G. Croft on the effect of electrical currents in animals.

The assessment of pain consciousness in animals has proved a very difficult problem in the past, but modern scientific methods of assessing current behaviour are taking the place of conjecture.

The B.V.A., meantime, is sponsoring an investigation into current methods of electrical euthanasia and hopes to be able to provide a final answer to some of the questions that as yet cannot be considered to be other than controversial.]

Introduction

The effects of electricity on the living body have been extensively studied during recent years, largely because of the interest in electro-convulsant therapy in human mental disease. Instruments and techniques have been perfected, and it is now possible to study this subject much more adequately than it was a few years ago. Electricity is commonly used in veterinary medicine for the electrocution of small animals, and in bacon factories and some slaughter-houses for stunning before killing.

The usual procedure for electrical destruction of cats in this country is to pass alternating current from the forefeet to the hind feet for about one minute, with an open-circuit voltage of 500 or 1,000 volts. The cat stands in a small cabinet with its forefeet on one moist sorbo rubber pad and its hind feet on another; these pads are the electrodes and the animal is prevented from jumping off them by the lid of the cabinet which is in contact with its back. The electrodes for the dog consist of a chain collar and either a hind leg shackle, or a metal tray on which the animal stands; all electrodes are wet, the chains being kept in a dish of electrolytic solution whenever they are not in use, and the tray containing a layer of the same solution.

The current in both animals passes through the thorax, but not through the head and brain; therefore it is not designed to stun the animal, but to kill it while it is conscious. In these circumstances it is essential that the process of killing shall be rapid; if the current passes through the brain as well as the thorax, so that the animal is stunned, the method of killing is less important. The apparatus now in general use causes death by asphyxiation or by ventricular fibrillation, according to the strength of the current (Ferris *et al.*, 1936). The value of the current normally is not recorded, and as it depends largely on the contact between the animal and the electrodes, it is likely to vary very much with individuals. Small currents cause death by asphyxiation, while larger ones produce ventricular fibrillation. Asphyxiation is a slow method of killing and arouses fear in the animal before death supervenes; it has been assumed in the past that once fibrillation starts, death occurs and the animal feels nothing more, but a recent study of the literature and experience in human medicine have indicated that unconsciousness does not necessarily coincide with the onset of fibrillation (Sugar & Gerard, 1938; Simpson & Derbyshire, 1934).

The apparatus described in this paper was designed with the object of causing instant unconsciousness as a result of an adequate current passing through the brain and giving rise to an immediate electroplectic fit; and of causing subsequent death as a result of the same current passing for a sufficient time through the heart and producing ventricular fibrillation. The object of the investigation was to ascertain whether a true electroplectic fit is always induced, to measure the time elapsing before the cessation of the heart's normal action, and to measure the mean and variance of the ohmic resistance of the animals, so that a comparison with existing data could be made. The observations will be extended to a larger number of assorted dogs and cats as soon as facilities are available.

Experimental Material.—Eleven dogs of both sexes of various breeds, ranging in age from eight months to four years six months, and in bodyweight from 15·8 to 25·0 kg.

Experimental Methods

The circuit was as shown in Fig. 1 and the current was mains alternating current at a nominal voltage of 220 to 240 volts. The electrodes consisted of a crocodile clip on the flank site, and a pair of 7½-inch artery forceps with insulated handles on the ear site. These contacts could be reversed and in practice crocodile clips, padded if necessary, would probably be most convenient for both sites. Rubber gloves were worn by both operator and assistant as a precaution during this experimental work, but they are not essential. The foot-switch was used initially as the operative switch, but it developed a fault and during the latter part of the work the mains wall-switch was used to close the circuit. In practice it would be very desirable to use a foot-switch for this purpose, so that both hands would be free. The current was measured by an Avometer of standard type.

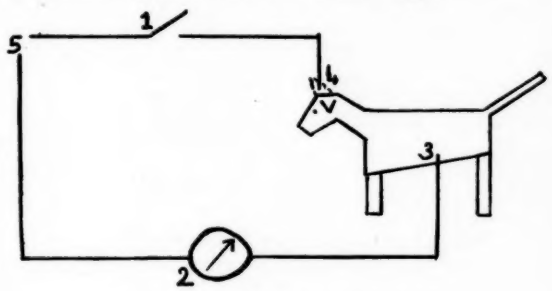

Fig. 1

Circuit for stunning and electrocution
(1) Foot switch.
(2) Avometer.
(3) Crocodile clip or artery forceps.
(4) ,, ,, ,,
(5) Wall switch for mains current.
Current
Voltage 220/240.
Frequency 50 cycles per second.
Alternating.

The following variables were studied in so far as the limited number of dogs allowed :—

(1) Physiological ... Sex.
Breed.
Age.
Bodyweight.

(2) Physical ... Effect of clipping hair on electrode site.
Wetting agent on electrode site.
Method of restraint.

(8) Electrical ... Magnitude of current.
Variation of current with time.

The dog was led into the operating theatre and the flank site clipped ; this site was over the last rib on the left side, about 2 inches lateral to the ventral mid-line. The ear site was on the anterior border of the right ear, close to the skull. This site was prepared, if necessary, and the dog was put on the operating table with the left side uppermost, the restraint being identical with that normally used for injection of the left saphena vein. The electrodes were fixed, after moistening the sites if necessary, and the current switched on ; this whole process of preparation occupied about two minutes.

The current was passed for varying periods of time and the condition of the heart followed by auscultation after the current was switched off. The general behaviour of the dog was observed, and a *post-mortem* examination of the thoracic organs and of the brain was carried out on each dog.

Results

The results of the electrocution process are summarised in Table I.

was switched off, at which time the musculature at once became flaccid. In some cases the heart had stopped when the current was switched off, but in others it had not and in these latter instances the dog would have regained consciousness if the current had not been restarted. It does not necessarily follow, however, that two doses of 15 seconds would have the same effect on the heart as one dose of 30 seconds in any particular animal.

Discussion

A great deal of information on electric stunning is available to-day, because this procedure is used in the electroconvulsant therapy of human mental patients, and also as a routine method in bacon factories. The behaviour of a living being which has been electrically stunned has been studied, the electrical activity of the brain has been recorded, and the subjective impressions of human patients have been described (Longley, 1949, 1950 ; Croft, 1952). This work showed that unconsciousness occurred when current passed through the head produced a genuine electroplectic fit. The characters of this fit consisted essentially of violent extension of the hind legs with stiffening of all limbs and

Table I
Effect of Variables on Electrocution Current in Dogs

Date	Breed	Sex	Age Y.	Age M.	Bodyweight (kg.)	Preparation	Current (mA.)	Time (seconds)
8.12.52	R.I.S. × A.H.	M.	0	8	19·8	5 per cent. saline : ear and flank clip	250	3 × 15
8.12.52	" "	M.	0	8	19·7	Teepol : ear and flank clip	250/300	Slip
10.12.52	" "	M.	0	8	18·2	Tap-water : flank clip only	200/300	30
11.12.52	" "	F.	0	8	15·8	" : " "	350/600	30
9.12.52	R.I.S.*	F.	1	10	22·4	" : ear and flank clip	110/140	2 × 30
9.12.52	" *	M.	1	10	32·0	5 per cent. saline : ear and flank clip	150/160	45
9.12.52	" *	F.	1	10	26·4	5 " " : " "	160/180	45
10/12/52	"	F.	1	10	25·0	Tap-water : flank clip only	300/400	30
10/12/52	"	F.	1	10	23·8	" : " "	250/500	30
9.12.52	"	M.	4	6	23·4	" : ear and flank clip	150/200	3 × 15
10.12.52	"	F.	1	10	21·4	" : flank clip only	350/600	20

R.I.S. = Red Irish Setter. A.H. = Afghan Hound. * Short coat.

Litter-mates are bracketed together. Where several short doses of current are shown, the heart was still beating when the current was stopped until after the final dose. Time was not measured in the second dog as restraint was inadequate and the electrode slipped. The two figures given under " current " refer to the value at the beginning and end of the electrocution period.

The following points are of particular interest.

(i) The heart was not stopped by a current of 250 mA. for 10 seconds.
(ii) The minimum initial value of the current was 110 mA.
(iii) Clipping the ear site was unnecessary.
(iv) Tap-water was a suitable wetting agent.
(v) The electrical resistance of the dogs varied widely in the present series, and this variation was not directly correlated with any of the other factors studied ; it was probably due partly to variations in the set-up (*e.g.*, strength of grip on forceps) and partly to the make-up of each individual dog.

Post-mortem examination showed in all cases that there were some small patches of haemorrhage in the lobes of the right lung and that these lobes were pale purple in colour ; the left lung was pink and without haemorrhage. All chambers of the heart were full and there was no macroscopic abnormality. The brain was normal in appearance and in every animal the anterior and posterior limits of the cerebrum coincided fairly closely with the limits of the base of the ear.

When the circuit was closed, violent extension of the hind legs occurred and the whole body became stiff, with the eyes closed ; urination almost always occurred and sometimes faeces were passed. This rigidity continued until the current

retroflexion of the head, together with arrest of respiration. If the current was passed for a few seconds only, as in procedures intended to stun but not to kill, this stage was followed by weak clonic contractions of the limbs and after this respiration restarted. The characters of an electroplectic fit were similar in the rat, rabbit, sheep, pig and man, and the presence of unconsciousness was confirmed by electro-encephalograms and subjective observations. If the current through the head was too small to cause unconsciousness, a variety of muscular reactions occurred but the violent extension of the hind legs with rigidity, and retroflexion of the head was not seen. The dogs in the present series all showed a true electroplectic fit, indicating that stunning was instantaneous and that death occurred while the animal was unconscious.

The method of electrocution in general use in this country to-day, in which the current does not pass through the head, is not intended to stun the animal ; it must therefore kill rapidly if it is to provide a humane method of destruction. If the current is large enough it probably produces ventricular fibrillation in a few seconds (Ferris *et al.*, 1936), but according to Sugar & Gerard (1938) and Simpson & Derbyshire (1934) an animal may remain conscious for 12 to 20 seconds after the heart ceases to beat. During this period

of time, current is passing through the animal, and human subjects have described the pain produced in this way as very severe ; in fact, it is said to be intolerable when the current reaches a value of 25 mA. The pain is due to muscular cramp initially, but there are also side-effects due to the anoxia produced by the damage to the respiratory muscles. Human patients with heart-block also state that unconsciousness does not occur as soon as the heart stops, and that the period of consciousness is one of fear and pain.

It is therefore obvious that a method of electrocution which does not stun may include a period of at least 12 seconds of intense pain ; this pain may cause the animal to faint, or electrical curarisation in which the muscles are paralysed may occur (Hume, 1935 ; Longley, 1949 ; Croft, 1952). If either of these conditions is present, it is not possible to test the state of consciousness by the usual reflexes.

A relatively small current passed through the brain produces instant unconsciousness, and this state persists for about a minute ; it therefore seemed very desirable to develop a method of electrocution for small animals in which instant stunning occurred, so that any possibility of pain during death was obviated. Dutch veterinary surgeons have used such a method for a number of years and have checked the state of consciousness of the animal by electro-encephalograms. A few English workers who were not satisfied as to the humanity of the usual method have devised their own modifications which have worked satisfactorily.

The method described in this investigation, in which the current was passed from the right ear diagonally across the animal to the left flank, included both the brain and the heart in the circuit and hence stunned instantaneously, and subsequently killed the dog. Preparation of the animal was quick and simple, and did not seem to disturb the dog ; mains voltage was used which minimised the risk of accidents to human beings and meant that the method could be used in an owner's home, with a sick animal lying in its basket. It is not advisable to allow the dog to stand up when the current is switched on, unless it is confined in a cabinet, since the violent extension of the hind legs may throw the dog against the furniture and dislodge the electrodes. In an owner's house provision should also be made for absorption of urine, as micturition and occasionally defaecation occur during electrocution.

Summary

A practical method for the immediate stunning and humane electrocution of small animals is described. The method uses mains voltage and the current is passed through the brain and heart by means of crocodile clips fastened to the diagonally opposite ear and flank.

The current passing through the dog during electrocution has been measured, and the effect of a number of variables studied.

The state of consciousness of an animal during the process of electrocution is discussed.

Acknowledgments.—I wish to thank Major C. W. Hume for drawing my attention to this problem, Mr. J. Hodgman and the staff of the Canine Research Station of the Animal Health Trust for providing facilities for the investigation, and Dr. Voute for demonstrations and information. I should also like to thank the Royal Society for the loan of an Avometer.

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CLINICAL COMMUNICATION

SOME OBSERVATIONS ON RABIES IN SHEEP

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The experience of witnessing a mass outbreak of rabies in a flock of sheep is regarded as being a sufficiently rare occurrence to warrant publication. The following observations are therefore offered for the interest especially of those who live in countries where rabies exists.

The clinical symptoms of rabies in sheep have been described in the literature of the subject. Udall (1943) gives the average period of incubation as three to four weeks.

In the cases described, during the previous three months up to the time the sheep were bitten, rabies had been diagnosed by the usual laboratory methods in a number of jackals in the district, particularly in the area around the farm concerned. During that period rabies had also been diagnosed in four honey badgers or ratels (*Mellivora capensis*), one of which had been killed on a neighbouring farm. In accordance with the general procedure in the Colony, each brain specimen was allocated a code number.

Subject.—A flock of Merino sheep.

History.—On June 21st, 1952, the owner informed the Department of Veterinary Services locally that he suspected rabies in a number of his sheep. The farm was visited soon afterwards the same day and a flock of some 150 Merino sheep were seen together in a pen. The owner contended that a number of them had been bitten by a ratel on the night of June 1st, *i.e.*, 20 days previously, and he reported that the native herd-boy had noticed that a number of them seemed to be excited the previous evening. The sheep had accordingly been penned up overnight. The ratel concerned was never subsequently found nor reported.

Examination.—Eventually 11 sheep were chosen from the flock as showing abnormal behaviour. In addition, one sheep had been found dead not far from the homestead and had died overnight. Two others were lying in a comatose condition outside the pen. In one of the latter there was profuse salivation. The respiratory rate was rapid and shallow in both. The eyes were closed and both showed opisthotonus.

Of the 11 chosen from the flock, one ewe (M.82) was reported to have been chewing the wool of one of the lambs and, on examination, appeared very excited. Between intervals of comparative rest, during which it displayed twitchings at the lips, general restlessness and excitability, it was aggressive towards its companions. This was the only real case of aggressiveness among the affected animals. There was no excessive salivation in this animal. Another ewe (M.83) salivated profusely and suffered from dyspnoea. When handled, it fell to the ground as if exhausted and lay for several minutes on its side before attempting to rise. The remainder of the animals chosen exhibited a general restlessness, abnormal sexual behaviour and excitement, demonstrated by riding each other continuously, twitching of the lips and wild staring eyes. One of these (M.84) was chosen to provide another brain specimen. In all, 40 animals appeared to have definite but healed wounds, as if from being bitten, on the face and forelegs,

including all those 11 sheep picked out. No bleating was heard (cf. the frequent bellowing often observed in rabid bovines), and there was no apparent irritation or itching of the scars of these wounds.

Diagnosis.—Rabies.

Progress.—Brain specimens were taken from the sheep found dead (M.79) and from the two sheep found comatose (M.80 and 81) under the usual precautions. The two ewes (M.82 and 83) and a further one of the 11 (M.84) were destroyed and the brain specimens removed. Each brain was divided longitudinally down the mid-line and the two halves were placed in separate jars containing 10 per cent. formalin and 50 per cent. glycerine respectively, and forwarded for further examination. The remaining eight sheep were marked with paint and retained separately.

On the night of June 25th, four days afterwards, seven of these died as clinical cases of rabies. On June 26th a further 15 ewes and four lambs were destroyed as showing clinical symptoms of rabies to a varying degree. On June 27th a further seven sheep died, among which was the remaining one of those originally marked with paint the first day of the general onset of symptoms. A further seven sheep were destroyed on June 28th with clinical symptoms of rabies and after this date no further cases were reported.

Histopathological Findings.—In view of the history of this outbreak, only the first three cases were examined. In accordance with laboratory routine, the hippocampus only was examined histologically.

The histopathology was typical of that seen in our previous cases of rabies in sheep, numerous negri bodies being present in the cytoplasm of the nerve cells of the hippocampus—especially after the line of cells curves on leaving the strata granulosa—often more than one in a cell.

The majority of the bodies were large and oval and many contained a central unstained area with peripheral basophilic granules. While, for the most part, the negri bodies were intracellular, a few extracellular were noted.

Discussion.—In all, 47 sheep died, with three cases diagnosed as positive histologically, and 44 clinical cases. Of these, 14 commenced to show clinical symptoms after being bitten on the face by a ratel 19 days previously. A further 19 showed obvious clinical symptoms 25 days after being bitten and were destroyed and seven had died after showing symptoms for a period of five to six days. One animal died a week after commencing to show symptoms. It is of interest to note that when the 19 were destroyed on June 26th, seven others were not showing sufficient symptoms to warrant destruction, but nevertheless they died the next day. A further seven sheep showed clinical symptoms 27 days after being bitten.

Acknowledgments.—Acknowledgment is due to Dr. D. A. Lawrence, Assistant Director of Veterinary Services (Research), Southern Rhodesia, for summarising the histopathological findings of the brain specimens submitted to him and to the Director of Veterinary Services, Southern Rhodesia, for permission to publish this communication.

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The number of cattle in Northern Ireland on January 1st was 2,200 less than a year ago, a reduction of 0·3 per cent. Sheep were increased by 50,800 or 10·6 per cent. and pigs 126,100 or 22·2 per cent. There was a drop of 7·2 per cent. in the figures for poultry.

PATHOLOGICAL COMMUNICATION

MASSIVE OEDEMA (EXUDATIVE DIATHESIS) IN PIGS FED ON A DIET RICH IN COD-LIVER OIL

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As part of a programme of work on absorption of fats, two normal Large White × Wessex litter-mate piglets (one gilt and one hog) were fed from weaning at eight weeks on May 10th, 1952, on a diet containing fat as a mixture of equal parts by weight of high grade pure cod-liver oil and lard. The non-fatty part of the diet consisted of fine bran 30, ground barley 27, flaked maize 20, fat-free herring meal 15, dried skim milk 15, ground limestone 1·25, sterilised bone flour 1 and sodium chloride 0·75 parts by weight, giving a calculated protein content of 25 per cent. and fat content of 3 per cent.; the animals had free access to water. The lard-cod-liver oil mixture (freshly prepared) was incorporated in the basal ration each morning and afternoon immediately before feeding. The amount of fat mixture was gradually increased until by the beginning of the seventh week of the experiment it comprised 50 per cent. by weight of the diet. The piglets were housed together in a wooden ark with access to an outdoor concrete run. The feeding scale and weight gains of the animals are given in the accompanying table.

Food Consumption and Weight Gains of Pigs Fed on a High Fat Diet

Days of experiment	Food eaten (lb. per day) by both pigs	Cod-liver oil (per cent. of diet)	Weight of pig (lb.)	
			Hog	Gilt
0	—	—	34	37
0– 7	2·90	5·2	36	39
8–14	3·16	5·7	37	46
15–21	3·34	9·7	44	49
22–28	3·90	15·4	48	53
29–35	4·06	19·1	54	60
36–42	4·30	22·9	61	66
43–49	Varied from day to day, with complete refusal by the hog on 49th day	25·0	66*	72*

* During this period oedema developed and hence the increase in weight was not due to growth only.

The animals appeared normal and ate all the food offered until the beginning of the seventh week when both lost appetite and did not eat all the food given. Both developed diarrhoea with traces of blood in the faeces. On the 44th day the hog passed pale gelatinous faeces and had a swelling of the neck and abdomen; similar swellings appeared in the gilt two days later. The condition of the animals deteriorated rapidly and both became unsteady in their gait and were disinclined to move. On the 49th day both pigs were killed by coal gas and examined *post-mortem*.

The findings were similar in both pigs, though the hog was more severely affected. The skin over the back appeared

normal. Ventrally there was a marked oedema of the skin and subcutaneous tissues extending from under the jaw to the rump where sagging bulges formed ; the legs were not oedematous. Internally, the main features were orange-brown granular fat and gross yellow gelatinous oedema extending from the skin over the chest and abdomen to the chest wall or peritoneum which contained straw-coloured fluid. Marked oedema was present at the duodenal-jejunal junction, at the root of the mesentery, in the mesocolon, perirectally and in the perirenal tissues which contained very little fat. The mucosae of the duodenum and jejunum were deep red, but the remainder of the gut appeared normal. The liver appeared normal, but the kidneys were enlarged and oedematous and on section the cortices were pale ; fluid exuded from the cut surfaces. The pericardium contained granular dark yellow fat in the line joining the anterior and posterior venae cavae and about 50 ml. of straw-coloured fluid were present in the pericardial sac ; the heart wall was thin with several small white patches on its external surface. The brain showed no encephalomalacia ; the aorta and large vessels of the other viscera appeared normal. On histological examination the main features were (1) a necrotic haemorrhagic duodenitis and jejunitis ; this lesion began sharply at the pylorus and became less severe in the jejunum ; (2) hyaline and necrotic areas of muscle in the heart ; (3) eosinophilic deposits within Bowman's capsule in the kidney. The livers appeared normal ; no dystrophic lesions were observed in the muscles of the hind limbs."

The dependant oedema resembled the exudative condition induced in chickens fed on high-fat diets deficient in vitamin E (Dam, 1944), to which he gave the name "exudative diathesis"; rats fed on similar diets do not develop oedema or encephalomalacia, though depigmentation of the incisors occurs (Granados & Dam, 1945). We are unaware of any previous account of experimentally induced exudative diathesis in pigs. The heart lesions presented similar features to those described in rats, rabbits, pigs and calves fed on diets deficient in vitamin E (see review by Blaxter & Brown, 1952-53). The absence of liver lesions confirms the work of Scorgie & Miller (1939), who fed low- and high-grade cod-liver oils to pigs at levels varying from 2 to 8·3 per cent. of the ration and, contrary to the reports of many Continental workers, found that no toxic liver dystrophy resulted. The same workers (1944) fed 4 oz. cod-liver oil per day to pigs and found that, although some retardation of growth rate occurred, no detectable lesions developed in any internal organs.

The inner and outer back tissues of both pigs were extracted to yield orange-brown semi-solid fats which had a green fluorescence in daylight. The fats had high iodine values, 82 to 87 (normal 50 to 65), high peroxide values, 50 to 110 milliequivalents per kg. (normal <5) and contained pigment similar to that described in vitamin E deficiency in rats and chicks (Dam & Grandos, 1945) and pigs (Robinson & Coey, 1951). A full account of the analysis of the back fats will be published later.

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ABSTRACTS

Immunity to Viruses*

The author considers the classification of viruses according to the type of immunity resulting from natural infection. Class I contains the viruses which produce a durable, perhaps lifelong, immunity and may be exemplified by smallpox, measles, yellow fever, canine distemper, swine fever, rinderpest, etc. These viruses give rise to acute systemic diseases : after recovery, neutralising antibodies are present in the serum, while the viruses themselves cannot be detected : all strains of each of these viruses are antigenically similar. Class II viruses give rise to diseases of which second attacks may occur, *e.g.*, influenza, poliomyelitis, foot-and-mouth disease, African horse sickness. These viruses cause the production of neutralising antibodies like those of Class I, and the chief reason for second attacks is the existence of antigenic differences between strains. In influenza, and possibly in foot-and-mouth disease, the antigenic constitution is continually changing, which accounts for the liability to two or more attacks. Furthermore, some viruses of Class II, *e.g.*, influenza, grow upon the surface of mucous membranes without contact with the blood stream. The immunity against the homologous strain of such viruses may be less durable than that against the viruses which have contact with the blood stream.

In Class III are the psittacosis-lymphogranuloma group and other viruses in which infection persists for long periods and relapses are common. These viruses are not neutralised or only feebly neutralised by antisera and the author suggests that whatever protection antisera do give may be more in the nature of sensitisation to phagocytosis than the neutralisation characterising the viruses of Classes I and II which acts by preventing viruses from entering or multiplying in susceptible host cells. It is noteworthy that with the exception of equine infectious anaemia, Class III contains the larger viruses.

Passive immunity may be conferred by antisera to viruses of Classes I and II. Active immunity may also be induced by attenuated or inactivated viruses of these classes although that produced by inactivated viruses is less durable. Any theory of immunity to viruses must take account of the facts that (*a*) infection with a virus confers a better immunity than does vaccination with the corresponding inactivated virus ; (*b*) with some diseases immunity may be present in the absence of neutralising antibody and *vice versa*. The author thinks that both these facts can be explained without resort to the notions of persisting virus which cannot be demonstrated and of cellular immunity. He considers that in all virus diseases antibodies are produced, a basic immunity is established by which antibody can be produced very rapidly and in high titre on second contact with a virus, and thirdly, a specific allergy is produced. He quotes evidence supporting the idea of specific allergy playing some part in immunity and describes an experiment in which persons were sensitised to living influenza virus given intranasally while others were not sensitised to killed virus given subcutaneously. The author speculates that vaccines of the future may stimulate an allergic response as well as an antibody response and wonders whether adjuvants may enable them to do this.

A. W. G.

* **Immunity to Viruses. A General Discussion with special reference to the Role of Allergy.** Beveridge, W. I. B. (1952). *Lancet.* **11.** 299–304. (10 refs.)

Canine Distemper and "Hard Pad" Disease*

Several experimental methods were used to determine the relationship between viruses of distemper (D) and "hard pad" (HP). Lederle strain of D was used and HP virus was that of Koprowski and others, which had been isolated from dogs with demyelinating encephalitis which, however, had shown no macroscopic evidence of hardening of the pads. Both these viruses were successfully adapted to growth on the chorio-allantoic membrane of fertile eggs on which they produced thickening and small, light grey lesions. After 26 and 38 to 43 egg passes D and HP viruses respectively became avirulent for ferrets yet solidly immunised them against challenge with ferret virulent homologous virus. Sera against D were prepared in ferrets and dogs. These, together with an HP antiserum from London, were shown to neutralise equally well both D and HP, when virus-serum mixtures were tested in eggs and ferrets. Ferrets vaccinated with egg-adapted avirulent D were immune to challenge with virulent HP and *vice versa*. Finally, tissue extracts from nine fatal cases diagnosed as "hard pad" were injected into susceptible ferrets and ferrets vaccinated against D. Six extracts set up fatal distemper in the control ferrets whereas the vaccinated ferrets remained normal; the other three extracts failed to produce disease at all. The author concludes that animals sufficiently immunised against distemper are resistant to "hard pad."

A. W. G.

* **Canine Distemper and "Hard Pad" Disease.** CABASSO, V. J. (1952). *Vet. Med.* **47.** 417–423. (9 refs.)

* * * * *

Blood and Milk Levels Produced by Sulpha Drugs*

This study was undertaken in the hope of securing information of practical value in veterinary medicine.

Details of the method of applying the drugs to the experimental animals, which included pigs, horses, sheep and calves, are given. All animals were dosed orally at the rate of 0·1 gramme per kg. and intravenously or intraperitoneally with 0·05 gramme per kg. and bled at stated intervals. The drugs were given as suspensions and no ill effects were observed.

In pigs the intraperitoneal route was employed owing to the difficulties of intravenous injection. Absorption was rapid and more regular than in calves and sheep.

In a group of six horses it was found necessary to drench with a watery suspension of the drugs. Two to three hours after dosing 70 per cent. of the haemoglobin was in the form of methaemoglobin, but the level fell sharply to below 40 per cent. by the time the maximum level of sulphone had been reached eight hours after dosing. Two such instances were also recorded in sheep, in which species sulphone may produce toxic, nervous symptoms.

In the sheep blood levels of sulphone rose to a peak two hours after injection which, it is suggested, is due to the fact that particles of the drug are arrested in the lungs and dissolve but slowly.

In a group of three cows dosed with sulphanilamide and a week later with sulphone, it was found that the latter produced higher blood levels but lower milk levels than the former. Calves were dosed individually from a bottle, and the younger the calves the higher the blood levels of both drugs.

The question of acetylation is also discussed, the rate of this process being proportional to the rate of disappearance of the drug from the blood. Probably the low acetylation of sulphamezathine explains the good levels produced in the calf. The results are recorded in graph form, and a measure of comparison between the various substances is arrived at by a comparison of the blood level curve area (B.L.C.A.). Doubling the dose of the sulphonamide drugs within the range used trebled the B.L.C.A. The average B.L.C.A.s produced in the pig, horse, calf and sheep were very similar, but the pig absorbed the drug much more rapidly than the calf or sheep.

The observations recorded indicated clearly how the behaviour of a group of drugs may be quite unpredicted in any species. Such variations are well illustrated and described. They also reveal the danger of transferring data uncritically from one species to another.

The results in the mouse resemble more closely those in man than those in any other species. Despite the relatively small dose used in man, higher levels were produced than in animals. In this respect sulphamezathine was outstanding. This, it is assumed, is due to the failure of the drug to pass freely from the blood stream into the tissues.

N. S. B.

* **Blood and Milk Levels Produced by Sulphone and Various Sulphonamides in Domestic Animals.** FRANCIS, J. (1949). *J. comp. Path.* **59.** 245–264.

REVIEW

[Hobday's Surgical Diseases of the Dog and Cat. Sixth edition. By J. McCUNN, M.R.C.V.S., M.R.C.S., L.R.C.P. Baillière, Tindall & Cox, 8, Henrietta Street, W.C.2. Price 30s.]

The previous edition of this book received notice in our columns five years ago (*Vet. Rec.* (1947.) **34.** 59), a period during which very considerable advances have been made in anaesthesia and surgical techniques. It is therefore with regret that the present reviewer (as with his predecessor) on making first acquaintance with this work has to agree with much of the criticism voiced on that occasion.

Whilst keenly appreciating the editor's desire to retain the traditional style of this well-known standard text-book, it must, we think, be agreed that at this time it is not possible by mere additions and amendments to the text to convert this into an up-to-date reference for the small-animal surgeon. The time is ripe for a really modern, well-constructed book on small-animal surgery to make its appearance—would the editor not consider devoting his talents to this task rather than perpetuating the medley of old and new that Hobday's book now represents? It requires the discerning eye of an experienced surgeon to sort out the new material; so often by only an odd sentence or paragraph does the editor mention new techniques which have virtually revolutionised certain aspects of surgical disease. How, then, is the student, for whom after all the book mainly is intended, to learn what is new, what well-established and proved sound procedure still in vogue, and what out-dated?

The habit of quoting exceptional cases (and portraying them) is not, we feel, a sound procedure. The student *must* first become familiar with the common conditions of every-day practice, their recognition, diagnosis and treatment, after which he is well able to assess for himself the unusual examples he will occasionally meet.

We repeat, it is with regret we voice these criticisms of an old and well-tried favourite. Why not now let it, in its traditional style, occupy the well-merited niche in veterinary literature which it has so long affectionately held without further attempts to overtake the times in which we live?

REPORT

Cyprus: 1951 Annual Report of the Department of Agriculture

This report was received in two parts, the first written by the C.V.O. and the second by the Livestock Officer.

ANNUAL REPORT OF THE C.V.O. FOR 1951

Owing to the failure of the rains during the previous quarter, the first half of the normal rainy season, hand-feeding to flocks on a liberal scale during the early part of the year had to be undertaken. However, rain in January brought on the pastures except in certain areas and in general the condition of sheep and goats remained satisfactory ; in the autumn the rains were good and pasture plentiful, hence there was a good supply of early lambs and milk which sold at high prices. Further improvement was noted in flock management, in the feeding of lucerne, etc., in the increased use of BHC preparations for the control of ticks, phenothiazine for internal parasites and mepacrine at controlled prices for the control of coccidiosis.

Large stock suffered from the poor grazing and chopped straw became expensive from the partial failure of cereals. The keeping and fattening of pigs, which is always dependent on the cereal harvest, was necessarily curtailed and there was little demand for young stock. There was a good market for meat and other animal products for local consumption and a good demand for the export of wool and hides and skins.

Cyprus continued to remain free from major epidemics which prevail in countries throughout the Middle East and, with the exception of bluetongue in sheep there was no contagious disease of importance. The efficiency of compulsory vaccination of 550,000 sheep and goats against anthrax, which at one time caused a mortality of 10 per cent., is now fully appreciated by flock owners. Nearly 40,000 sheep were inoculated with bluetongue vaccine imported in concentrated form from South Africa. Ox warble fly eradication is regarded as complete, No outbreak of Newcastle disease was observed since the previous year.

The field veterinary staff continued to perform such duties as the inspection of premises licensed under the Dairies & Cowsheds Regulations, licensing of stallions under the Horse Breeding Law, the supervision of meat inspection of principal towns and villages and the inspection of animals and their products for export, the quarantine of imported animals and clinical treatments of livestock.

The laboratory staff, in addition to preparing vaccines for anthrax, fowl-pox and other diseases, dealt with 2,000 specimens for diagnosis and engaged in various investigations, including "Q" fever, phosphorus deficiency, abortion in sheep and the control of sheep nostril fly. For *Oestrus ovis* a stained 15 per cent. tetrachlorethylene emulsion was administered via the nostrils and by intra-sinal injections and showed that the latter method was more reliable.

Phosphorus deficiency investigations revealed from blood analyses that apart from the months of plentiful green food, locally fed native cows showed blood values below the normal range. Treatment with bone meal and hypodermic injections of sodium acid phosphate was nearly always successful. These animals were in poor condition and had depraved appetites but no signs of stiffness. No actual evidence of P deficiency was observed in sheep but in a small number it was noted that barren ewes averaged a higher P blood value than recently lambed ewes of the same flock.

In the absence of tuberculosis or other serious disease, meat inspection was concerned chiefly with hydatid cysts and other parasites.

The Dogs (Importation) Order of 1951 replaced the Order of 1935 and incorporated provisions to permit the importation of dogs from the United Kingdom with a reduced quarantine of 12 days, provided they were imported by air in adequately ventilated but sealed containers, otherwise the quarantine period remained at six months.

ANNUAL REPORT OF THE LIVESTOCK OFFICER

Owing to the partial failure of the rains from October, 1950, to May, 1951, there was an almost complete failure of cereals and legumes, and fodder crops for hay making and silage did not mature.

The shortage of farm crops necessitated additional purchases of concentrates and with the aid of small quantities of irrigated green crops it was possible to maintain the animals on the Government Stock Farm in good condition. By the end of the year, due to the early rains in September, the natural pastures and crops provided grazing, but owing to the rise in price of feeding-stuffs the demand for breeding stock fell.

Government stud stables and animals on the loan scheme were maintained at seven stables throughout the year.

The Poultry Extension Scheme met with considerable progress in the distribution of R.I.R. cockerels since three poultry instructresses were provided with motor transport. Also, for the first time day-old chicks were sold at specially reduced rates to villagers to improve their stock. The R.I.R. showed superiority over other breeds in egg yield and size and greater profit per bird. Incidence of disease was lessened due to improved methods of management. Farmers' days, poultry and dairy husbandry courses were held.

Pig breeding and fattening trials were conducted, on the whole with good results in spite of the changes in climatic conditions. The Large Whites imported two years ago continued to do well and several boars were loaned for crossing with Large Black sows, but the Large Black continues to be the main breed.

The Damascus breed of goat has become universally popular and under good management produces good milk yields, but Saanen goats moved to hill areas gave better milk yields, suggesting that this breed is better for hilly country. A trial showed that natural rearing gave better live weight gains than by bottle feeding and involved less work.

During the year repairs and improvements to the Government Stock Farm were carried out and, in spite of shortage of natural grazing and farm crops, the milk yield of the dairy herd was increased considerably. Vigorous culling has made the herd of a good uniform type. The good results from the local Fat Tail Sheep made flock owners keen to secure ram lambs for milk yields. A range trial with turkeys indicated that less than 30 per cent. of food saving could be made.

H. H.-B.

British Medical Association Lecture.—The Sir Charles Hastings Lecture, 1953, will be given by Professor F. A. E. Crew, F.R.S., M.D., F.R.C.P. (EDIN.), Professor of Public Health and Social Medicine in the University of Edinburgh, at B.M.A. House, Tavistock Square, London, W.C.1, on Wednesday, May 6th, 1953, at 6.30 p.m. The subject of the lecture will be "Medicine and Social Policy," and the Rt. Hon. Walter Elliot will preside. Admission free, by ticket, obtainable on application to Public Relations Department, B.M.A. House, Tavistock Square, London, W.C.1.

XVth International Veterinary Congress at Stockholm

The United Kingdom Committee received on Thursday, April 16th, the following information from the XVth International Veterinary Congress Organising Committee in Stockholm.

We are anxious to let you know that applications for Ordinary and Extraordinary Membership can be submitted also after April 1st. It will be difficult, however, to procure the accommodation desired if the application forms arrive here after May 1st. Colleagues whose application forms have not been received by us before July 1st cannot be included in the List of Members.

Finally, the Organising Committee have the honour of introducing themselves. The Committee has the following composition:

Mr. Axel Alegren, Veterinary Councillor, Royal Veterinary Board, *Chairman of the Committee*, Stockholm.

Mrs. Frida Alegren, Stockholm.

Mr. Gösta Björkman, District Veterinarian, Chairman of the Swedish Veterinary Medical Association, Vagnhärad.

Dr. Sven Dyrendahl, Associate Professor, Department of Animal Husbandry, Royal Veterinary College of Sweden, Stockholm.

Dr. Karl Eriksson, Professor, Dean of Royal Veterinary College of Sweden, Chief of Department of Animal Husbandry, *President of the Congress*, Stockholm.

Dr. Albert Hjärre, Professor, Director of State Veterinary Medical Institute, *Vice Chairman of the Committee*, Stockholm.

Mr. Axel Isaksson, Chief of Department of Pathology, State Veterinary Medical Institute, *Secretary of the Committee*, Stockholm.

Captain Gunnar Krantz, Army Veterinary Surgeon, Swedish Army Command, Secretary and Treasurer of the Swedish Veterinary Medical Association, Stockholm.

Dr. Nils Lagerlöf, Professor, Chief of Department of Obstetrics and Gynaecology, Royal Veterinary College of Sweden, Stockholm.

Mr. Olof Swahn, Chief of Advisory Department, State Veterinary Medical Institute, Stockholm.

With collegial regards,

Very truly yours,

For the Organising Committee,

Axel Alegren, Chairman,

Axel Isaksson, Secretary.

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Conducted Post-Congress Tours

TOUR THROUGH SOUTH SWEDEN

Saturday night, August 15th.—Departure by train from Stockholm. Sleeping car.

Sunday, August 16th.—Arrival at Helsingborg in the morning. Tour by bus to the Cold Storage Plant of Helsingborg, the Animal Hospital at Helsingborg, Sofiero Castle (summer residence of the royal family), Kullaberg (with its beautiful natural scenery), Vegeholm Castle and Rosendal Castle (private residences), and back to Helsingborg. Breakfast, lunch, dinner.

Monday, August 17th.—Tour by bus to the Swedish Seed Association at Svalöv, the South-West Skane Insemination Centre in Lund, Akerlund and Rausing's package factory in Lund (modern food, especially milk packages) the Cathedral in Lund, the Simintorp Estate at Blentarp (with its modern agricultural establishments), and back to Helsingborg.

Prices per Person

A. *Swedish kronor* 194:—Including second class railway tickets Stockholm—Helsingborg (ordinary ticket, supplementary tickets for express train and sleeping-car), bus tickets, accommodation in double room (twin beds), meals, admission fees, demonstrations, guides and tips.

B. *Swedish kronor* 142:—Including second class sleeping-car ticket (but not ordinary railway ticket nor supplementary ticket for express train) and otherwise as Alt. A.

C. *Swedish kronor* 168:—Including third class railway tickets, and otherwise as Alt. A.

D. *Swedish kronor* 133:—Including third class sleeping-car ticket (but not ordinary railway ticket nor supplementary ticket for express train) and otherwise as Alt. A.

This tour is especially intended for those who will leave Sweden via Malmö.

Accommodation in Helsingborg for the night between August 17th and 18th can be arranged if applied for in connecion with the application for participation in the above tour.

TOUR THROUGH WEST SWEDEN

Sunday, August 16th.—Departure for Skövde by train from Stockholm in the morning. Seats reserved.

Tour by bus from Skövde to Skara with a visit to the Skara Veterinary Institute (a veterinary clinic and research station) and back to Skövde via the Varnhem Monastery Ruin (first erected in 1150). Departure for Göteborg by train. Arrival in Göteborg in the evening.

Monday, August 17th.—Sight-seeing tour by bus in Göteborg. Tour by bus to the Rossared Estate at Kungsbacka (a representative farm). Motor-boat tour in the archipelago. Return by bus to Göteborg. Breakfast, lunch, dinner.

Tuesday, August 18th.—Breakfast.

Prices per Person

A. *Swedish kronor* 196:—Including second class railway tickets Stockholm-Göteborg (ordinary ticket, supplementary tickets for express train and for reserved seat), bus tickets, accommodation in double room (twin beds), meals, admission fees, demonstrations, guides and tips.

B. *Swedish kronor* 181:—Including third class railway tickets, and otherwise as Alt. A.

C. *Swedish kronor* 151:—Including ticket for reserved seat (but not ordinary ticket nor supplementary ticket for express train), and otherwise as Alt. A.

This tour is especially intended for those who will leave Sweden via Göteborg.

Forms of application for the above tours can be obtained from the Secretary, United Kingdom Permanent Committee, 9, Red Lion Square, Holborn, W.C.1.

Reduced Railway Fares for Foreigners Attending the Congress

The Organising Committee have made the following arrangements for a reduction in the price of railway tickets in Sweden and Norway for journeys to and from the Congress.

Sweden.—Twenty-five per cent. reduction in the price of railway tickets for single journey, in second and third class, from Swedish border stations to Stockholm and return journeys to the same or other border stations.

The reduction does not apply to supplementary fares for express trains, sleeping-cars, etc.

Norway.—Twenty per cent. reduction for journeys of at least 100 kilometres between stations in Norway and stations on the Swedish-Norwegian border. In other respects, the same regulations apply as in Sweden.

Special requisition forms should be used for the purchase of the reduced tickets referred to here. These forms will be sent direct to the members of the Congress in June or July, 1953, together with confirmation of required accommodation, or separately.

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SPECIAL MEMBERSHIP

The following letter has also been received:—

XV. International Veterinary Congress
Organising Committee, c/o Isaksson
State Veterinary Medical Institute,
Stockholm 50, Sweden.

Dear Colleagues,

The Organising Committee have the honour of inviting you to apply for Special Membership of the XV. International Veterinary Congress, which will take place in Stockholm, August 9th to 15th, 1953.

Special Membership is intended for Authorities, Veterinary Medical Schools, Veterinary Faculties, Libraries, and Veterinary Associations, which will not be represented at the Congress, and for colleagues who are unable to attend the Congress in person. Special Members will receive the Proceedings of the Congress, Part I (including nearly 300 sectional reports) and Part II (including 10 plenary lectures and the contributions to the discussions after the sectional reports).

The Proceedings of the Congress, Part I, will be published before the beginning of the Congress, and Part II as soon as possible after its conclusion.

The price of the Proceedings of the Congress, Parts I and II, is 45 Swedish kronor including postage.

Application for Special Membership should be made to the XV. International Veterinary Congress, *Stockholm* 50, Sweden, before August 1st, 1953.

With collegial regards.

Very truly yours,

For the Organising Committee.

Axel Alegren, Chairman.

Axel Isaksson, Secretary.

Here again, forms of application (for Special Membership) can be obtained from the Secretary, United Kingdom Permanent Committee, 9, Red Lion Square, Holborn, W.C.1.

QUESTIONS IN PARLIAMENT

Tuberculosis in Cattle: Eradication Not Detrimental to Human Immunity

In the House of Commons on April 14th, Mr. Woodburn asked the Secretary of State for Scotland how far the eradication of tuberculosis in cattle is detrimental to human immunity from the disease; and whether he will give an authoritative report on the value of the attested cattle scheme in relation to public health.

Mr. J. Stuart: I know of no scientific foundation for any assertions that the eradication of tuberculosis in cattle is detrimental to human immunity from the disease. The number of new cases of non-respiratory tuberculosis in Scotland, which was largely of bovine origin, has fallen by more than 50 per cent. since the introduction of the Attested Herd Scheme.

Mr. Woodburn: Will the right hon. Gentleman try to give publicity to these facts, because there are in Scotland suggestions that the attestation of cattle is detrimental to success in eliminating tuberculosis from human beings?

Mr. Stuart: I will gladly give the fullest possible publicity.

Colonel Gomme-Duncan: Will my right hon. Friend go into this in more detail than his statement, in view of the figures produced by a qualified veterinary surgeon, which are causing a certain amount of disturbance in the public mind?

Mr. Stuart: Yes. I assure my hon. and gallant Friend that I will do what I can. Medical advice is to the effect that it is impossible to correlate the incidence of respiratory tuberculosis with the safety of the milk supply reaching the consumer. I have no reason to suppose that there is anything to support the theories to which the right hon. Gentleman and my hon. and gallant Friend have referred.

Mr. Woodburn asked the Secretary of State for Scotland to what extent in the counties of Scotland with a relatively high incidence of pulmonary tuberculosis, a connection can be traced between that rate and the proportion of attested cattle in the same area.

Mr. J. Stuart: The increase in the number of new cases of respiratory tuberculosis notified since 1939 is due to a variety of causes, including better means of diagnosis, which cannot be precisely assessed. Good progress has been made with the eradication of tuberculosis in cattle, but I am advised that the coincidence of such progress with increased respiratory notifications in several areas in no way establishes a relationship of cause and effect.

NOTES AND NEWS

Diary of Events

April 25th.—Spring Meeting of the North of Scotland Division, B.V.A., at Aberdeen (Northern Hotel), 2.30 p.m.

April 25th.—30th Annual General Meeting of the Association of State Veterinary Officers, in the Auditorium of the Wellcome Foundation, 183-193, Euston Road, N.W.1, 2 p.m.

April 30th.—Meeting of the West of Scotland Division, B.V.A., Clinical Club, in Glasgow Veterinary School, 7.30 p.m.

May 1st.—Meeting of the Yorkshire Division, B.V.A., at York (Royal Station Hotel), 2.30 p.m.

May 1st.—Society of Practising Veterinary Surgeons: A meeting of Council will be held at the Royal Veterinary College, Camden Town, at 4 p.m.

May 5th.—Meeting of the Midland Counties Division, B.V.A., at Stafford (The Swan Hotel), 2.30 p.m.

May 7th.—Annual General Meeting of the Central Division, B.V.A., at the Royal Veterinary College, N.W.1, 6 p.m.

May 13th.—Meeting of the Editorial Executive, B.V.A., 2.30 p.m.

May 13th.—Annual General Meeting of the South-East Midlands Division, B.V.A., at Northampton (Franklins Gardens Hotel), 7.15 p.m.

May 14th.—Laboratory Animals Bureau Symposium (on "Laboratory Animals") at the Royal Society of Medicine.

R.C.V.S. Engagements in Edinburgh

May 27th to 29th, 1953, R.C.V.S. Committee and Council Meetings: Quarterly Meeting of Council, May 29th; preceded by Special Meeting of Council. At the Royal (Dick) School of Veterinary Studies, Edinburgh, 9.

May 27th.—Annual General Meeting of the R.C.V.S., 4 p.m., to be held at the Royal (Dick) School of Veterinary Studies, Edinburgh, 9.

R.C.V.S. Dinner in Edinburgh, 7 p.m.

May 27th.—Annual General Meeting of the Victoria Veterinary Benevolent Fund, 4.30 p.m., to be held at the Royal (Dick) School of Veterinary Studies, Edinburgh, 9.

June 12th.—Annual Dinner of the R.A.V.C. Officers' Club, at Grosvenor House, London.

Aug. 9th—15th.—XVth International Veterinary Congress, Stockholm, Sweden.

Sept. 6th and 12th.—Seventy-first Annual General Meeting and Congress of the British Veterinary Association, at Aberdeen.

R.C.V.S. Examinations

Wednesday, May 6th.—Animal Management Examination commences at London.

Thursday, May 7th.—Entries for D.V.S.M. Examination due.

Friday, May 8th.—Pharmacology, etc., Examination (Revised Syllabus)—Written Examination.

Monday, May 11th.—Pharmacology, etc. (Revised Syllabus), Orals and Practicals (London and Dublin).

Thursday, June 4th.—D.V.S.M. Written Examination commences at Edinburgh (2 p.m.).

Monday, June 8th.—D.V.S.M. Orals and Practicals.

Thursday, June 25th.—M.R.C.V.S. Written Examinations.

Friday, June 26th.—Ditto.

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R.C.V.S. Dinner in Edinburgh

The annual general meeting of the Royal College of Veterinary Surgeons at 4 p.m. on Wednesday, May 27th, at the Royal (Dick) School of Veterinary Studies, University of Edinburgh, will be followed by a dinner for all members of the Royal College of Veterinary Surgeons and their ladies at the North British Hotel, Edinburgh. This will be at 7 p.m. for 7.30 p.m. (evening dress). The cost will be £1 per person, inclusive of coffee but not of drinks. Applications for tickets, together with remittance, should be made to:—

The Registrar,
R.C.V.S.,
9, Red Lion Square,
W.C.1,

who will supply any other information which may be required.

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71st B.V.A. ANNUAL CONGRESS, ABERDEEN, SEPTEMBER 6th to 12th

FISHING FACILITIES AND HOTELS

As was intimated in our issue of last week, fishing facilities for intending visitors to the Congress are available on the Rivers Dee, Don and Ythan; some hotels within easy distance of Aberdeen cater specially for anglers.

Arrangements have been made by the Local Committee for members of the Congress to obtain fishing free or at a nominal charge, and Mr. E. F. Hardwick, 30, Hamilton Place, Aberdeen, has offered to deal with enquiries. If accommodation at a fishing hotel is desired, these should be made as early as possible.

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REPORT ON ARTIFICIAL INSEMINATION OF CATTLE

This booklet, which was issued to members recently, is now available at 3s. 6d., post free, to veterinary students (and to members requiring further copies) and at 6s. 6d. post free to other students, members of the public and institutions, etc.

PERSONAL

Births.—Beaumont.—On March 26th, 1953, at Lincoln, to Joan (*née* Barker), wife of G. L. Beaumont, M.R.C.V.S., a brother for Jane and Michael.

Broad.—On April 14th, 1953, to Honora (Terry), wife of Richard C. Broad, M.R.C.V.S., a son (Simon Cottle).

Gibson.—On April 10th, 1953, to Helen (*née* Mitchell, M.R.C.V.S.), wife of W. W. C. Gibson, B.Sc., M.R.C.V.S., 23, Stafford Street, Market Drayton, a daughter.

Kerr.—On April 18th, 1953, at 28, Corve Street, Ludlow, to Jill and Jim Kerr, a son, John Seumas.

Walker.—On March 31st, 1953, to Betty (*née* Tolfree), wife of Charles Walker, M.R.C.V.S., Veterinary Department, Uplands, near Nairobi—a daughter, Dorinda (a sister for Christina).

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Marriage.—Pengelly—Oliver.—On March 18th, 1953, at Falmouth Parish Church, James Pengelly to Kathleen Joan Oliver.

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Ministry's Veterinary Field Staff : Changes in Personnel, etc.—The following announcements have recently been made:—

Mr. F. J. Hill, M.R.C.V.S., D.V.S.M., Veterinary Officer, Gloucester, has been promoted to Divisional Veterinary Officer.

Mr. J. C. Dring, M.R.C.V.S., has been appointed to the permanent staff as Veterinary Officer and is stationed at Leicester.

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The Late Mr. Richard Hedley, M.R.C.V.S.—It is of interest to note that Mr. Richard Hedley, of Kingsbridge, South Devon, before he came South from Manchester (as recorded in our obituary notice of April 11th) was an apprentice with Mr. G. H. Locke. His father was a well-known farrier and not, as stated, a member of the profession.

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Appointments.—Mr. Donald F. Hamilton, M.R.C.V.S., having relinquished his post in the Gambia, has accepted an appointment with the Sudan Veterinary Service, which he will be taking up in the near future.

The following appointments in the Colonial Veterinary Service are announced: Mr. J. Armour, M.R.C.V.S., to be Veterinary Officer, Nigeria; Mr. N. St. G. Hyslop, B.V.Sc., M.R.C.V.S., as Veterinary Research Officer, Kenya, and Mr. W. P. Unsworth, M.R.C.V.S., as Veterinary Officer, Dept. of Agriculture, Trinidad.

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Lord Boyd Orr's Concern for Pakistan.—Lord Boyd Orr, former Director-General of the United Nations Food and Agriculture Organisation, and an Honorary Member of the B.V.A., has arrived in Karachi to become Chairman of the newly-formed Pakistan "Grow More Food" Emergency Committee.

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Livestock Feeding in Europe. FAO Meeting in Paris.—Mr. L. E. Hughes, M.R.C.V.S., D.V.S.M., N.D.A., one of the Ministry's Veterinary Investigation Officers, attended a meeting of the Food and Agriculture Organisation of the United Nations in Paris towards the end of March. The meeting was held to consider problems of livestock feeding in Europe.

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R.C.V.S. OBITUARY

Heather, Joseph Charles, M.R.C.V.S., Risley Mount, Sandiacre, near Nottingham. Graduated Edinburgh, December 14th, 1895. Died April 13th, 1953; aged 79 years.

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The Late Mr. J. C. Heather, M.R.C.V.S.

Mr. Joseph Charles Heather, M.R.C.V.S., whose death we record above with deep regret, was actively engaged in his professional duties to within a few days of his passing, at Sandiacre, at the age of 79 years.

A member of a very old Irish family, Mr. Heather was born at Newry, Ireland. His first appointment after qualifying in Edinburgh with honours was as an assistant at Newbury (Berkshire). Afterwards he became assistant to Mr. Rossell, veterinary surgeon at Sandiacre. There he married Miss Florence Andrews, of Sandiacre Hall.

As veterinary surgeon, he toured with George Sanger's circus and menagerie for two years, and gained much veterinary experience with wild animals, an experience which stood him in good stead as a consultant in later years. Mr. Heather also did a considerable amount of research work into veterinary therapeutics. He practised in Ireland for about a year, and was Chief Veterinary Officer and Inspector of Dairies to No. 1 District Council of County Down, but in 1900 he returned to Sandiacre and took over Mr. Rossell's practice.

Mr. Heather was President of the Derbyshire Veterinary Association for a long period, and for many years was veterinary surgeon, and afterwards consulting veterinary surgeon to Long Eaton Council, Beeston U.D.C. and Stapleford R.D.C. He held numerous veterinary inspectorships, and during the 1914-18 war he was veterinary surgeon to the War Office. He officiated as honorary veterinary surgeon to numerous societies, including Derbyshire Agricultural Society, West Hallam Hedge Cutting and Ploughing Association, Ilkeston Division of the National Farmers' Union, etc.

A hunt veterinary surgeon, Mr. Heather was well known as an authority on hunters, and at one time was veterinary surgeon to the Earl of Harrington, South Notts, the Belvoir and the Meynell Hunts. Always in great demand as a judge of horses, one of his last appointments in this respect was at the Derbyshire County Agricultural Show last year.

His wife died at Christmas, 1951. Two sons and one daughter are bereaved. The elder son, Mr. John Francis Heather, is a civil engineer in London. The younger son, Mr. Ernest Joseph Heather, is a veterinary surgeon, with a large practice in Oxford.

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GENERAL OBITUARY

Mr. E. KEITH ROBINSON

We record with deep regret the death of one of the best-known workers in the field of animal welfare in Mr. Evan Keith Robinson, Secretary of Our Dumb Friends' League, which took place on the night of Thursday of last week after a long period of ill health, at the age of 50 years. Some three months ago he was obliged to give up work, and for the last two months was in St. Andrews Hospital, Dollis Hill, courageously bearing a long and painful heart trouble.

Mr. Keith Robinson was appointed to the League in 1935, and his able and devoted service has done much to foster the influence and promote the well-being of a great organisation. His loss will be mourned by many members of our own profession who had practical experience of co-operating with him in seeking the solution of problems common to animal welfare societies and ourselves.

In this connection, Mr. P. J. Quigley, M.R.C.V.S., Chief Veterinary Officer of the League's hospital at Victoria, writes: "E. K. R. has very suddenly left us. To the members of the profession who had association with him this is a severe loss. In the very difficult liaison between the welfare societies and the profession he showed admirable understanding and justice. As a man, all who worked with him knew that when he died something very important in their lives had gone."

Mr. Keith Robinson's last public appearance was as a witness before the Duke of Northumberland's Committee on Horse Slaughter, returning to his bed after giving evidence. He was indeed not to be deterred by physical or any other form of difficulty from giving of his utmost to fulfil the foundation conception of the League as "a society for the encouragement of kindness to animals." Two years ago he inaugurated the "Horse Protection Scheme," designed to save horses from cruelty and unnecessary slaughter and, at the same time, to draw public attention to the rapid diminution in the horse population. During this period the League has bought up at ports of entry and at sales in every part of the country, over 500 horses, loaning them out to farmers, etc., under an agreement which stipulates qualified veterinary care. Another of his highly successful projects was the institution of the educative National Children's Dog Shows, which have been held to date in 34 different centres, attracting big entries from the young owners of "any kind of dog" ready to participate in a competition having only two objects—the promotion of the health of the animal and of a good relationship between the dog and the child. The entries are judged by veterinary surgeons, exemplifying once again Keith Robinson's insistence that the oversight and treatment of animals are primarily the concern of members of the veterinary profession.

Mr. Keith Robinson's activities were by no means restricted to the successful functioning of "Our Dumb Friends' League." He became Vice-President of the World Federation for the Protection of Animals and Chairman of the British Federation of Animal Welfare Societies, this latter being the continuation of many years of work in an endeavour to unite the movement for the advancement of the well-being of animals.

The funeral service took place at Golders Green on Tuesday, last, when there was a large and representative attendance. Mr. Keith Robinson had asked that there be no mourning, or flowers sent, but that if any of his friends wished, a gift should be sent to Our Dumb Friends' League.

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SWINE FEVER ORDER

PROHIBITION OF MOVEMENT (EXCEPT UNDER LICENCE) IN THREE AREAS

The Ministry of Agriculture and Fisheries announces that, in view of the increase in swine fever in certain counties in England, an Order has been made declaring three areas to be swine fever infected areas. These areas comprise respectively the counties of the East and West Ridings of Yorkshire; the counties of Essex, Suffolk (East and West) and Norfolk; and the counties of Gloucester, Salop, Stafford, Warwick and Worcester.

The Order, which comes into operation on April 27th, prohibits the movement of pigs into, out of and within the Infected Areas except under licence, and pigs must not be allowed to stray upon any road in the areas. Pigs may, however, be moved through the areas by rail provided they are not untrucked in the area. The Order also prohibits the holding of sales and gatherings of swine in any market, fairground or saleyard in the areas, unless permission to hold the sale or gathering has been obtained from the Local Authority. Permission will not be given unless all the pigs to be exposed for sale are fat swine intended for immediate slaughter.

Similar Orders have been made from time to time in the past to control the holding of markets and the movement of pigs in areas where swine fever has been prevalent and invariably the making of the Orders has quickly been followed by a material reduction in the number of outbreaks of disease. It is hoped that the restrictions now imposed will have a similar result and that it will not be necessary to keep the Order in force for an unduly long period.

Copies of the Order may be obtained from the Ministry of Agriculture and Fisheries, Hook Rise, Tolworth, Surbiton, Surrey.

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TAX RELIEF ON FOOT-AND-MOUTH DISEASE COMPENSATION

Included among a number of provisions of special interest to the farming community in the Chancellor's Budget statement last week, were some affording relief in taxation as applied to compensation funds paid in respect of stock ordered to be slaughtered on account of foot-and-mouth disease. To help farmers thus burdened by tax Mr. Butler proposes to give them the opportunity to elect for the herd basis of assessment. This, he said, would apply to farmers who had suffered the slaughter of a substantial part of a herd in the last year or two.

The N.F.U.s of England and Wales and of Scotland had made representations to have removed the hardship whereby an owner, receiving compensation on a reasonably generous scale, was then, through subjection to income tax, deprived of a considerable part of the resources given him in order that he might re-build his herd. The Chancellor has now agreed to reopen the option that herd-owners had up till a few years ago whereby they could "elect" to have their stock treated on the "herd basis" as distinct from the "trading-stock" basis.

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HOUSING OF FARM LIVESTOCK

Under the auspices of the N.A.A.S. a Conference on Fixed Equipment on the Farm was held in Oxford on Tuesday, April 14th. The general subjects discussed were the Design and Construction of Buildings and Yards for Young Stock and Store Cattle, the Housing of Pigs, and Grain Drying and Storage on the Ordinary Farm.

Whilst there was much of general interest, in the case of Mr. David Black's paper relating to the housing of pigs there was a good deal of particular significance to the veterinarian. Mr. Black described his successful method or rearing pigs over the last 30 years and from his detailed description it was quite clear that what we are only to-day stressing as being vital points in the control of diseases of the pig up to weaning age—such as control of temperature fluctuations, dry floors with adequate bedding and low roofs—had contributed in large measure to Mr. Black's success. He allows no direct excess to the outside and so avoids draughts, and ensures that concrete floors are put down with air bricks which, with the addition of plenty of straw for bedding, provides for the necessary dryness and warmth. The comfort of the sows under these conditions is reflected by the absence of any farrowing rails or system of protecting youngsters from being over-laid.

It was pointed out that whilst, on paper, buildings could be designed which would seem to fit the case, the proof of their value could only be secured after animals had been reared successfully in them for some years.

N. S. B.

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LABORATORY ANIMALS BUREAU

It is announced by the Bureau that a symposium on laboratory animals will be held at the Royal Society of Medicine, 1, Wimpole Street, London, W.1, on Thursday, May 14th, 1953, commencing at 2.30 p.m.

An opening paper, "The Feeding and Husbandry of Laboratory Animals," will be read by Mr. A. H. Worden, M.A., B.SC., M.R.C.V.S., of Cromwell House, Huntingdon. A paper on "The Function of the Animal Technician," will follow, from Mr. A. E. Mundy, Hon. Secretary Animal Technicians' Association, Boots Veterinary Science Division, Thurgarton, Nottinghamshire. After an interval for tea, Mr. J. Scarnell, B.V.SC., M.R.C.V.S., of the Wellcome Veterinary Research Station, Frant, Kent, will speak on "The Control of Infection in Small Animal Breeding Units," and the series of papers will conclude with a contribution by Mr. J. S. Paterson, PH.D., M.R.C.V.S., D.V.S.M., Ministry of Supply Animal Farm, Porton, Wiltshire, on "The Provision of Animals for Research."

There will then be a general open discussion. The Chairman will be Dr. H. J. Parish, of the Wellcome Research Laboratories, Langley Court, Beckenham, Kent, and all those working in laboratories where animals are used are invited to attend.

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HUMANE SLAUGHTER OF PIGS

In the House of Commons on April 15th, Brigadier Rayner asked leave to introduce a Bill to provide for the humane slaughter of pigs in places other than slaughterhouses and knackers' yards.

Leave was granted and the Bill was brought in and read a first time.

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ADDRESSES OF DISEASE-INFECTED PREMISES

The list given below indicates, first, the county in which are situated the premises on which disease has been confirmed, followed by the postal address and date of outbreak.

ANTHRAX:

Ayrshire.—Barcosh Farm, Beith (Apr. 14).

Ches.—Green Farm, Aston-juxtra-Mundrum, Poole, Nantwich (Apr. 13); Farewell Grange, Threapland, Aspatria, Carlisle; Hanns Hall Farm, Willaston, Wirral (Apr. 14); Sinderland House Farm, Dunham Massey, Altrincham (Apr. 15); New House Farm, Threapwood, Malpas (Apr. 16).

Cornwall.—Netherton, Upton Cross, Liskeard (Apr. 14).

Essex.—Dock Field, Little Stambridge, Rochford (Apr. 13).

Dumfriesshire.—Drum, Thornhill, Dumfries (Apr. 16).

Hants.—Blackmoor Farm, Froxfield, Petersfield (Apr. 13).

Lancs.—Fair Rigge Farm, Staveley, Newby Bridge, Ulverston (Apr. 16).

Northumberland.—Bellisterhaugh Farm, Haltwhistle (Apr. 15).

Suffolk.—Walnut Tree Farm, Wattisfield, Diss (Apr. 16).

Wigtownshire.—North Two Mark, Stoneykirk, Stranraer (Apr. 16).

FOWL PEST:

Berks.—Birch Grove, Ralphride, Bracknell (Apr. 14).

Middlesex.—Hithermoor Farm, Stanwell Moor, Staines (Apr. 16).

Norfolk.—The Stores, Horsford, Norwich (Apr. 14).

Suffolk.—Middleham House, Woodditton Road, Newmarket (Apr. 14).

Surrey.—Milford Cottage Garden and Paddock, Milford, Godalming (Apr. 14).

SWINE FEVER:

Cambs.—"The Grove," Waterside, Irleham, Ely (Apr. 17).

Ches.—Merehayes Farm, Mere, Knutsford (Apr. 15); Peneby House Farm, Barnston, Heswell Hill, Wirrall; Dodd's Farm, Sealand Road, Chester (Apr. 17).

Berks.—East Shefford Farm, East Shefford, Newbury (Apr. 16).

Bucks.—Beverley Cottage, Newton Longville, Bletchley (Apr. 14).

Ches.—Merehayes Farm, Mere, Knutsford (Apr. 15).

Cornwall.—Roseland House, Constantine, Falmouth; Rosemundy, St. Agnes; West Street Field, Penryn (Apr. 13).

Derbys.—Pilsbury House Farm, Willington, Derby (Apr. 14); Edge's Buildings, Bolllidon, Ashbourn (Apr. 15).

Devon.—13, Alpha Place, Appledore, Bideford (Apr. 13).
Essex.—Rothman's, Great Baddow, Chelmsford; Barnard's Farm, Great Holland; New House Farm, Gestingthorpe (Apr. 14); Brown's Farm, Leaden Roding, Dunmow (Apr. 15); Gardener's Farm, Theydon Garnon, Epping (Apr. 15); The Bungalow, Stebbing Road, Felstead, Chelmsford; "The Nest," Highwood, Writtle, Chelmsford (Apr. 17).
Flints.—Glasfryn, Northop Road, Flints (Apr. 16).
Glos.—Cambridge House Farm, Cambridge, Gloucester (Apr. 13); Bush Farm, Redmarley; 35, Fir Tree Lane, St. Geirge, Bristol; Bank View Farm, Bamfurlong, Badgeworth, Laverton Halt, Laverton (Apr. 14); Severn View, Awre Road, Blakeney (Apr. 15); No. 7 Smallholding, Lockleaze Lane, Lockleaze, Horfield, Bristol (Apr. 16); Lockleaze Smallholding No. 3, Filton, Bristol; Moor House Farm, Hallen, Bristol (Apr. 17).
Hants.—Wyde Farm, Damerham, Fordingbridge (Apr. 14).
Herefords.—Fayre Oaks Cottage, King's Acre, Hereford (Apr. 14); Stocken Farm, Lucton, Leominster (Apr. 16).
Kent.—Blackdale Farm, Dartford (Apr. 13); Little Mowshurst Farm, Edenbridge (Apr. 16).
Lancs.—Nook Lane Piggeries, Fernhead, Warrington (Apr. 15).
Leics.—Old Hall Farm, Brannstone (Apr. 14).
Mont.—Bryn-Aber, Llansantffraid (Apr. 17).
Norfolk.—The Hall Farm, Stalham (Apr. 14); Sandygate Farm, Terrington St. Clements, King's Lynn (Apr. 16).
Notts.—Manor Farm, Colwick, Nottingham (Apr. 17).
Oxon.—The Tite Inn, Chaddington, Oxford (Apr. 13); Coalpits Farm, Bampton (Apr. 14); Glebe Farm, Windrush, Oxon (Apr. 15).
Radnor.—Cnwch Farm, Newchurch, Radnor (Apr. 14).
Rutland.—33, Council Houses, Exton, Oakham (Apr. 14).
Salop.—Yew Tree House, Lower Frankton, Oswestry; Piggeries, Whittington Road, Oswestry; Fern Cottage, Neen Sollars, Kidderminster (Apr. 13); Dandyford, Hordley, Ellesmere (Apr. 14); Hale Oak Farm, Newcastle, Craven Arms; Dandyford, Hordley, Ellesmere (Apr. 15); 6, Lower Perthy, Ellesmere (Apr. 16).
Staffs.—Draycott, Stoke-on-Trent (Apr. 13); 8, Stream Road, Wordsley (Apr. 14); Moreland Farm, Crankhall Lane, West Bromwich (Apr. 15).
Somerset.—Totterdown Farm, Old Mixon, Weston-super-Mare; Galcombe Farm, Long Ashton (Apr. 14).
Suffolk.—No. 7, The Street Far, Holywell Row, Mildenhall, Bury St. Edmunds; Hall Farm, Cowlinge, Newmarket; 6, St. Johns Street, Bury St. Edmunds; Lake Farm, Rougham, Bury St. Edmunds; Moat Farm, Thorndon, Eye, Suffolk (Apr. 17).
Surrey.—Greenleas Farm, School Road, Smallfield, Horley; "Ashmead." Drill Hall Road, Chertsey (Apr. 13).
Sussex.—Tidebrook Manor, Wadhurst (Apr. 14); Piggery, Lottbridge Drove, Eastbourne (Apr. 17).
Warwicks.—Dove House Farm, Shustoke, Coleshill (Apr. 13); 301, Highbridge Road, Sutton Coldfield (Apr. 15); The Piggeries, Kingsbury Road, Minworth, Birmingham (Apr. 16); Corley Hall Farm, Corley, Coventry; Springfields Towers, Fillongley, Coventry (Apr. 17).
Worcs.—Brook Farm, Martley, Worcester; Longcroft, Lower Lane, Wolverley, Kidderminster (Apr. 13); St. Peter's Road Yard, Netherton, Dudley; Aston Court, Knighton-on-Teme, Tenbury Wells (Apr. 14); 36, Fairfield, Kidderminster; Wheeler's Farm, Hillcroome, Worcester (Apr. 15).
Yorks.—Old Popplewell Farm, Scholes, Cleckheaton; 13, Devonshire Place, Harrogate (Apr. 13); Brackengrove Piggeries, Sheepridge, Huddersfield; Manor Farm, Langtoft, Driffield; Pear Tree Farm and Willow Farm, Fangfoss, York; Rytham Gate Farm, Seaton Ross; Spen Valley Road Allotments, Ravensthorpe, Dewsbury (Apr. 14th); 148, Kilnhurst Road, Rawmarsh, Rotherham; Mowbray Hill, Well, Bedale; 372, Denby Dale Road, Durkar, Wakefield; 96, Morthen Road, Wickersley, Rotherham (Apr. 15).

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LOCUST MENACE BRINGS NEW INTERNATIONAL CO-OPERATION

The emergency created by the latest developments in the present desert locust plague which threatens the Near and Middle East and Africa brought new and immediate international co-operation at a meeting convened by the Jordan Government held at Amman, Jordan, March 14th to 16th. Countries represented at the meeting were: Jordan, Iraq, Lebanon, Saudi Arabia, Syria, Turkey. In addition, the British Desert Locust Control Organisation, the United States (through T.C.A.), and FAO were represented. Its purpose was to decide on immediate emergency measures to control breeding of locusts in southern Jordan and northern Saudi Arabia. If these breeding swarms are not controlled, there will be grave danger of heavy invasion in the late spring and early summer, throughout the whole region from Egypt to Iran.

As a result of this meeting, various international units were already by the end of March moving into Saudi Arabia from Jordan, Syria, Lebanon, Turkey and also Egypt. These missions now are co-operating in the affected area with the Desert Locust Control, which already operates in Saudi Arabia. Most important in the whole story of the fight against this present plague is the way these missions are operating hundreds of miles outside their own national borders to tackle the plague at its source for the common good. FAO, too, was able even before the Amman Conference to help Jordan with considerable equipment from the organisation's special pool, consisting in this instance of Land Rover vehicles and considerable spraying and dusting equipment.

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HARRY STEELE-BODGER MEMORIAL FUND

Tenth List of Donations

The Appeal Committee again acknowledges with grateful thanks the following further donations to the Fund:—

	£	s.	d.
Total announced on April 11th	3,204	5	4
Association of Veterinary Teachers and Research Workers	10	0	0
Mr. T. A. M. Chambers (Wolverhampton)	2	2	0
Mr. D. R T. Davies (Tredegar)	1	1	0
Farmers' Club	21	0	0
Dr. Angus Foggie (Edinburgh)	1	1	0
Miss L. E. Knight (Swindon)		5	0
Lancashire Veterinary Association	25	0	0
Mr. I. M. Lauder (Glasgow)	1	1	0
Lay Staff, Sutton Coldfield Veterinary Practice of Steele-Bodger and Brancker	1	10	0
Mr. J. L. R. Leach (Birmingham)	1	1	0
Mrs. Macnamara (Middleton-on-Sea)	3	3	0
Ahmed Rashid (Zanzibar)	2	2	0
Lieut.-Colonel R. H. Robertson (Hong Kong) ...	1	1	0
South Staffordshire Hunt	5	5	0
	£3,279	17	4

The subscription lists will close on April 30th, but in the case of organisations and societies not meeting before that date the Hon. Treasurer will be pleased to accept donations later.

A list of future contributions will be published in *The Veterinary Record* on May 9th.

All donations should be sent to

S. L. Hignett,
Steele-Bodger Memorial Fund,
B.V.A.,
36, Gordon Square,
London, W.C.1.

Cheques, postal orders, etc., should be made payable to "Steele-Bodger Memorial Fund."

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal opinions of the writer only and their publication does not imply endorsement by the B.V.A.

CURARE IN SURGERY

Sir,—With the use of curare, or one of its synthetic substitutes, the grim fact that they paralyse the nerves of motion but not those of sensation should be borne in mind. The human or animal under its influence cannot move a muscle or cry out, yet remains completely conscious to pain.

When curare is used in conjunction with an anaesthetic how can the degree of anaesthesia or the awakening therefrom possibly be determined?

Humane consideration for animals is the keen desire of veterinary surgeons and it would therefore appear that to refrain from the use of curare, or its substitutes, would be much the safer plan.

If the use of curare was made illegal many wretched animals would be saved the nightmare of pain when awakening from the anaesthetic yet still suspended and held inert under these dread drugs.—Yours faithfully, Alfred Brisco, Organising Secretary, The National Equine (and smaller animals) Defence League, Blackwell, Carlisle.